APRIL 1949

THE MGA BULLETIN

No. 15

ORGAN OF THE MUSHROOM GROWERS' ASSOCIATION

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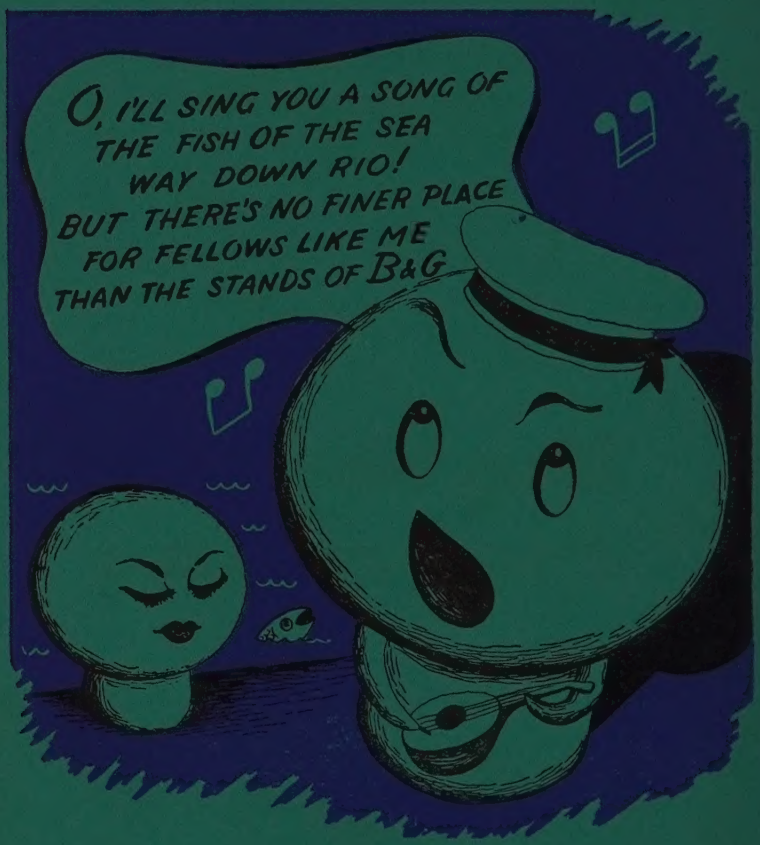

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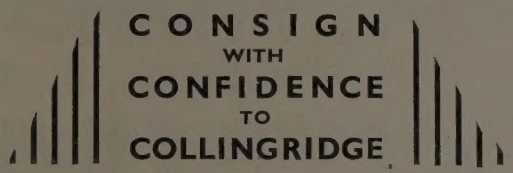

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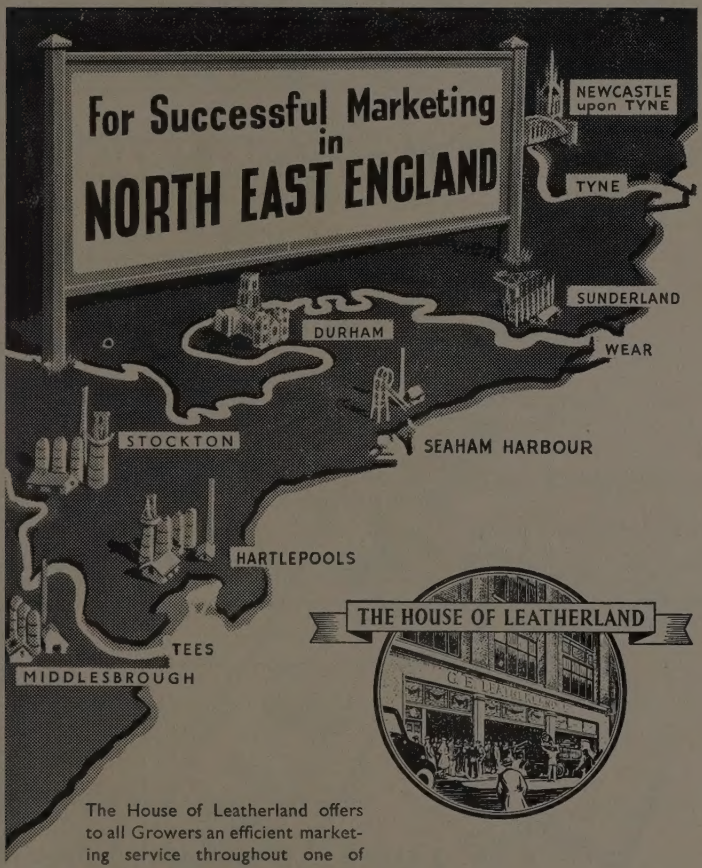

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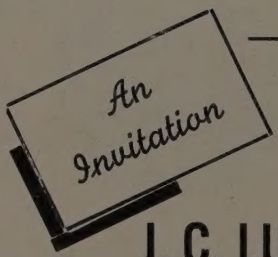

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THE

APRIL 1949

BULLETIN No. 15

No responsibility can be assumed by the Editor, the Editorial Board, or the Mushroom Growers' Association, for statements made or views expressed in this Bulletin, or for any advertisements included in this publication.

RESEARCH RESPONSE

We are already two-thirds of the way along the road towards the target set by our Research Appeal. Satisfaction with this progress may surely be justified, for quite half our grower-members of the M.G.A. have yet to send in their contributions—if they **are** going to contribute, that is.

Let him who has not yet responded to our Chairman's personal letter of 7th January, say to himself: "If I send along my cheque, research can go on; if I don't, research may well have to be abandoned. Is £10, say, too heavy a premium to pay to insure my future? If I don't need research now, may I not do so next year—or the year after?"

We hope they will subscribe shortly. Although £10 from each would see us through, there are many small growers who have been very generous but who cannot afford this sum, and we do rely on the larger growers to give us something more in the region of £25.

The Grower recently had a pertinent leader on this very problem. Speaking of Dr. Hatton's constant distraction in appeals for funds to keep East Malling going, the comment is made: "At the present time a situation strangely parallel to that of the East Malling pioneers faces the mushroom industry . . . . . We are sure that what the Kent growers did with such difficulty in 1915, the mushroom growers of 1949 will take in their stride."

Thursday, 5th May, is a date for your diaries. Those who have taken on trust the statement that the Mushroom Research Station is doing useful work, and have subscribed accordingly, will no doubt welcome the opportunity of paying a visit to Yaxley on 5th May, when Dr. Edwards and his Staff will demonstrate the M.R.A. Synthetic Compost **at each turn,** from first stacking to the stage when it is ready for the house.

A synthetic compost needs rather different management from that usual with horse manure, and those who wish to try the new formula will be well advised to come along and see in what ways it differs. There is certain to be a large gathering on the day, and anyone who has attended meetings of mushroom growers knows how refreshing it is to meet others and "talk shop."

FROM THE SECRETARY

NEWS FROM M.G.A. HEADQUARTERS

Glasshouse Fuel. A recent letter from the Ministry of Agriculture points out that it is important to reduce the demands on anthracite and that in future when new or additional allocations are made for glasshouse fuel they will be granted along the following lines: (1) 100% coke. (2) If this is not practicable, up to 75% L.V., and the balance coke. (3) If this is not practicable, up to 75% anthracite and the balance coke. The authority for the decision will rest between the Regional Fuel Officer and the Horticultural Sub-Committee of the A.E.C. (*Note:*—Enquiries reveal that L.V. stands for Low Volatile).

Visitors to Yaxley. Members have always been welcome to visit M.G.A. Headquarters and both Messrs. Noble Mushrooms Ltd. and I have been glad to give what help we can. Recently however there has been such a flow of growers and would-be growers that work has been seriously hindered. After giving the matter some thought it has been decided to hold an informal 'Open Day' on the first Thursday in each month. By this means we hope to be able to do justice to both our visitors and our work. There is an added advantage in that growers coming on that day will have the opportunity to talk things over amongst themselves.

Mr. P. C. Major. Members will learn with regret that Mr. Major, our Honorary Treasurer, has been seriously ill. One of the first and keenest members of the Association, Mr. Major has served on the Executive Committee from the beginning. Members will join with the Committee in wishing him a speedy return to good health.

Mr. A. DeB. Hovell. Members will wish to congratulate Mr. Hovell, Vice-Chairman of the Executive Committee, upon his appointment to the Chair of the Worthing and West Sussex Branch of the N.F.U.

U.S.A. Tour. So many growers expressed the wish to visit America and inspect the Mushroom Industry over there that the Executive Committee had enquiries made to see whether this was possible. The answer has now been received to the effect that it would be a very tough nut to crack and that impressing upon the Treasury the necessity for the supply of dollars would be 'an extremely formidable task.' The alternative would be for members going on the trip to undertake a sales campaign in that country for the sale of British mushrooms. The latter 'opportunity' is as encouraging as the former . . . . .

Sir James Turner. It was the N.F.U. President, knighted in the New Year's honours list, who, as Guest of Honour at the First Annual Meeting of the M.G.A., said: "I am a fundamental believer in research,

and in the results of research being made available to all. People who have expended their time, efforts and money in setting in motion a Research Station can ill-afford to liquidate all they have done in the interests of the common grower unless he too is prepared to shoulder some responsibility."

Agricultural Wages Board. The minimum agricultural wage for a man has been raised from 90 - to 94 - per week, with corresponding increases for women and juveniles, and the hours have been reduced from 48 to 47 hours per week. This has been described by representatives of the National Union of Agricultural Workers as ' absurdly inadequate,' and a minimum of £6 per week is being sought.

Darlington's Mushroom News. All growers will welcome the return of an old friend in the form of *Darlington's Mushroom News*, which has not been published since 1938. Two copies have been kindly presented to the M.G.A. library for the use of members.

Development. We are hoping to get a small quantity of timber for development of mushroom farms. (This does not include replacement of bedboards). If we succeed, how much would you require during the next 12 months?

THE M.G.A. EXECUTIVE

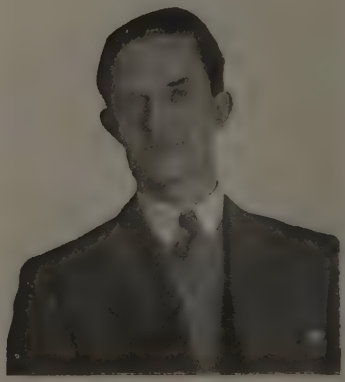
LT. GEN. SIR OLIVER LEESE, BART. K.C.B., C.B.E., D.S.O.
Chairman, 1949
Vice-Chairman, 1948
Executive (Research Member), 1947—

A. DEB. HOVELL
Vice-Chairman, 1949
Executive (Imports & Tariffs), 1945—
Chairman, Worthing and West Sussex N.F.U., 1949—

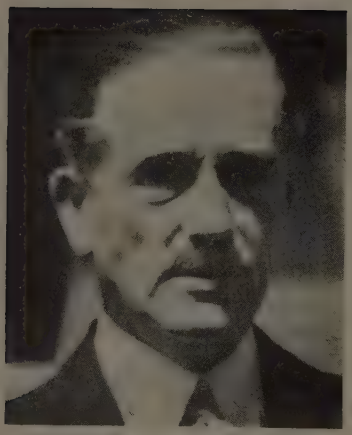
H. S. ALLSOP
Executive, 1948—

FRED. C. ATKINS
Executive, 1945
Hon. Secretary, 1945-7
Bulletin Editor, 1946-7
Member, Advisory Panel, 1947—
Chairman, Insecticides Committee, 1948-9
N.F.U. Representative, 1948

C. P. CHAMBERLAIN
Executive, 1947—
Member, Advisory Panel, 1947—



F. L. FILMER
Executive, 1949
N.F.U. Representative, 1949



CAPT. G. P. LAWRENCE
Executive, 1949—

G. M. McARTHUR
Executive, 1945-7, 1949—

STANLEY MIDDLEBROOK
Executive, 1945 –
Bulletin Editor, 1945-6
Vice Chairman, 1945-7
Chairman, 1948

R. PATTERSON
Executive, 1945—

C. L. SINFIELD
Executive, 1945—

J. STEWART-WOOD
Executive, 1948—
Member, Grading Committee, 1948

PERCY C. MAJOR
Hon. Treasurer, 1945—
Executive, 1945—
Chairman, Rules Committee, 1945

ANGUS WATSON
Secretary, 1947—
Bulletin Editor, 1947—

MUTUAL AID

Members Ask Your Advice

The purpose of this Mutual Aid Section is to provide an opportunity for members to seek the advice of other growers. The success of the section depends entirely upon whether members are prepared to help their fellows by sending to the Secretary their answers to these queries.

Q. 111. With reference to your subscription notice for 4 guineas I would like to point out that I already subscribe to the local branch of the National Farmers' Union and would therefore like to know whether part of this is paid to another branch of the N.F.U.

Q. 112. Can you tell me the number and best position for wall and roof ventilators for a mushroom house 80 ft. long, with two sets of beds 4 tiers high and 6 ft. wide? Is it of any advantage to fit exhaust fans?

Q. 113. I intend to use electric heating in a new house. What is the best method -(1) Low voltage strip heating, (2) Tubular heaters, or (3) Combined electrical and water heater?

Q. 114. Where can I obtain plans or specifications for mushroom houses?

Q. 115. What types of soil sterilizer are there available? Which do you recommend?

Q. 116. When composting fresh stable manure, what type of starter is best to use, the amount of gypsum, the amount of phosphates, and the amount of urea (if any)?

Q. 117. Are the waste products from penicillin production of any use as a source of nitrogen in "pepping up" long-straw manure for mushroom composts?

Q. 118. Following a very vigorous spawn run, the first flush is coming through with small caps and very thick stems. Some of the caps are cracking on top. What's wrong?

Q. 119. Is it possible to grow mushrooms without soil? I hear that it is done in South Africa, but cannot trace the source.

Q. 120. I am finding with my last crop that the mushrooms are forming directly on top of the compost underneath the soil, and that the mycelium does not spread into the soil. What is the reason? To add to the confusion, some mushrooms have even formed through holes in the bedboards, and picking is done (as it were) standing on one's head.

Q. 121. Can you let me have any information on the short method of composting expounded by Dr. Sinden on his recent visit?

Q. 122. Can you tell me whether a system of electrical soil heating is considered practicable in mushroom beds?

Q. 123. Are the results obtained by any form of heating by electricity satisfactory? Could we have an article on all possible methods?

Q. 124. What is your opinion on the sterilization of casing soil by formaldehyde? How does one set about it?

Q. 125. Can you tell me what is the best commercial way of insulating the ceiling of mushroom houses roofed with wood and felt?

Q. 126. I have some mushrooms, the caps of which appear to be eaten away in saucer-shaped fashion, the eaten-away part having a shiny glass-like surface. I cannot see any life on the affected part, even with a hand lens. What is the cause? In 12 years I have never seen this peculiar effect before.

Q. 127. Would some grower advise me on the best type of pressure sprayer for general use on my farm of 4,200 sq. ft. of indoor beds in darkened mushroom houses?

Q. 128. How much wheat straw is used per week (or p.a.) to litter one horse in an average commercial stable?

Q. 129 What is meant by the American method of pasteurization? Are both air and bed temperatures raised to 140° F.? Does this destroy all insect life? Or must we still fumigate with sulphur?

Answers to Previous Questions

Q. 101. *What humidity should we keep our mushrooms at?*

Mushroom houses (during production) must be humid; that is, the atmosphere must be moist (between 70-85% relative humidity).

DR. A. M. KLIGMAN.

Q. 102. *Would you please put me in touch with a firm manufacturing manure-turners and spreaders?*

Messrs. De La Pre Components Ltd., Hon. Members of the M.G.A., are the only people we know who manufacture manure-turners. Their address is Little Meadow Works, Houghton Road, Northampton. (EDITOR.)

There are many types of spreaders on the market now; the suppliers advertise in nearly all the agricultural papers. NOEL D. HARDING.

Q. 103. *I should be pleased to have your impressions of the use of creosote for the treatment of boards and the super structure in mushroom houses.*

Bedboards creosoted annually last 10 years or more with care. To fill a house when the creosote is still wet is inadvisable, in case rose comb is induced, but this is a moot point. I have known many houses produce well despite a definite smell of creosote throughout the crop and no flies to bother about, incidentally! By painting bed boards with creosote the surface is protected, but the mushroom mycelium in the compost will run right up to creosoted boards. FRED. C. ATKINS.

Good quality creosote applied to boards and superstructure of mushroom houses is the finest preservative known at the moment. It should be applied at high pressure and the house or houses aired for a week before filling. Warm air internally will help considerably to drive off the fumes. Good quality creosote will not only be more readily absorbed by the wood, but the spray jet will be less liable to become blocked. "Celcure" is said to be the more effective than creosote.

NOEL D. HARDING.

Q. 104. *I would be much obliged if you could tell me what depreciation is allowed by the Tax Authorities on mushroom houses.*

Mushroom houses are regarded by the Inland Revenue authorities as farm buildings, and if erected after 5th April, 1944, are eligible for 10% depreciation p.a. for 10 years.

FRED. C. ATKINS.

Q. 105. *We have had for the past six years sudden "droppings off" of crop. We think it is in the dung. New houses have been affected. We have seen yellow spherical spores giving yellow patches throughout the compost one month after picking starts. There is always a typical smell. We believe it is Verdigris, but what can we do about it? It is very serious. The mycelium in the compost is very thready and grows into the casing matted and coarse.*

I would say it was Verdigris. It quite possibly cuts down the yield by half. The mycelium of Verdigris is white, and only in its fruiting stage is it sulphur-yellow, the colour of the spores. The presence of mushroom spawn in the bed facilitates the growth of Verdigris, and when growing together you cannot tell them apart. The pH requirements of mushroom spawn and Verdigris are identical, to a fraction; but Verdigris will not grow in manure of high pH. Superphosphate in the manure would help the Verdigris to grow more rapidly, due to the dropping of the pH by the super. It is a very serious disease from the point of view of yield. It is not one of those diseases that you bring in with the casing soil; a bed left unsoiled will be just as bad as one soiled. It is a carry-over in the shed—not vegetative but spore. When pulling out a shed the spores fly all over and fumigation with formaldehyde and permanganate will give no control. The only practical thing I can very much recommend is to wash the shed down with a water hose, inside, roof and all. Don't half do it. Call in the Fire Brigade! Water in plenty gives good results, I think you will find.

G. RICE.

Q. 107. *Our mushrooms are breaking their membranes very quickly, having long, thin stems and being very light in weight. The temperature has been between 54 and 62 F., and we have given plenty of air. Is it because our soil is only 1" to 1½" deep?*

The depth of your soil isn't your trouble. I suggest the following: (*a*) The spawn you use might be a strain which produces small, thin stemmed mushrooms. (*b*) Your manure might have been over composted. (*c*) Left over compost from last filling might have been mixed with fresh dung. (*d*) How about moisture? (If the questioner would care to communicate with me personally I would enlarge on these points).

NOEL D. HARDING.

You are perhaps giving your house too much air, resulting in a dry atmosphere. Try closing the house up, and make conditions more humid. I have just had four mushrooms weighing 1 lb. 2 oz. (the largest 6 oz.) off one tray cased with less than ½" soil.

T. ORRITT.

Q. 108. *My soil for casing has a pH of 8·1. What treatment is necessary to reduce the alkaline content?*

Surely none is required?

FRED. C. ATKINS.

Add good quality peat at rate of ½ bale peat to 5 cu. yds. of soil. I would be inclined to try less than the above and note the effect. It is easy to add more if necessary.

NOEL D. HARDING.

Q. 109. *Can you advise me on a good liquid insecticide for spraying over compost heaps, doorways to houses, and cropping beds?*

The Insecticides Committee's Report is published this month.

(EDITOR.)

For compost heaps and doorways to houses, use Flit or Sheltox. If it is intended to spray beds as a routine measure spray with either Gammexane (1 to 400 parts) or D.D.T. Emulsion at rate of 1 part Emulsion to 400 parts water. These sprayings must be done between "flushes."

NOEL D. HARDING.

Grading and Packing Mushrooms

Capt. M. E. FEW ATTACKS

Mr. Atkins " thinking aloud " on page 20 of the last issue certainly does so somewhat succinctly. Do other Growers disapprove as strongly as does Mr. Atkins of the suggestions put forward by the Grading and Packing Committee? If so, why not join Mr. Atkins in his protest? The suggestions of the Committee were published in the Bulletin to be approved or shot down by Growers . . . . . Possibly the solution may be found from a plebiscite, if our hard-working Secretary could find the time to organise one.

I would like to cross swords with Mr. Atkins on some of the points contained in his own suggested Grades and Notes thereon. He deplores any idea of protection against persistent abuse of an agreed Standard of Grading and Packing under a Mark to indicate that Standard, and suggests it would be sufficient if Wholesalers were asked to report any really bad cases of misrepresentation by Growers. But what then? In such a case I suppose a protest would be made to the offender. If it was without effect, and the abuse persisted in, it would be to the detriment of the whole industry. What would Mr. Atkins propose to do in this contingency?

" *BUTTONS: Veil unbroken, cap diameter less than* $\frac{3}{4}$*".*" I maintain that a Mushroom (sold fresh and not for canning) with a cap diameter of *less than* $\frac{3}{4}$" is nothing but a " chat " and not a Grade at all. Ask any Salesman for his views on this point.

" *CLOSED CUPS: Veil unbroken, cap diameter* $\frac{3}{4}$" *to* 3"."

" *OPEN CUPS: Veil broken, cap diameter* $\frac{3}{4}$" to 3"." I submit that if two Mushrooms, measured with a ruler, are laid side by side, one having a cap diameter of $\frac{3}{4}$" and the other 3", it would be agreed by most Salemen that here was too much variance to be in the same chip basket.

" *FLATS: No size restrictions at all.*" My goodness!

I believe in studying these questions as far as possible from the Salesman's angle as opposed to what is found to be the most convenient in any particular Grower's Packing Room. To that end I have visited a well-known London Market on several occasions, watching my own and other people's mushrooms being sold, afterwards talking to the actual Salesmen who did the selling and obtaining their views. I am convinced that only by grading and packing exactly what the Salesman says he can sell most easily (which must be what the public wants) can we obtain the best prices in the long run.

I challenge Mr. Atkins to canvass personally a few Salesmen to obtain their views, at any Markets where *Graded* Mushrooms are sold, then to reconsider his own previously expressed opinions and publish the result in the next Bulletin. Finally I would like to add my confidence that if a man of Mr. Atkins' Churchillian character decides to " cross the floor " he will not hesitate in doing so

THE RESEARCH FUND

SPLENDID RESPONSE TO INITIAL APPEAL

ANOTHER £700 NEEDED

The Appeal to enable the Mushroom Research Station at Yaxley to continue its investigations into the problems of the mushroom grower was launched on 7th January, with a target of £2,500. Almost by return of post came a cheque for 200 guineas from **Messrs. Broome and Green Ltd.,** with this letter :—

" For a good many years we have claimed to be, and we quite sincerely believe we are, the largest sales distributors of mushrooms in this country. We are not insensible of the responsibility which this entails, or the confidence placed in us by so many mushroom growers, and it is therefore natural that we are pleased to embrace any opportunity to assist the mushroom industry as a whole, and it is with great pleasure that we contribute 200 guineas to your Research Station."

Sir Oliver Leese at once replied :—

" As Chairman of the Mushroom Growers' Association I have the privilege to thank you personally in addition to the normal appeal receipt for your very generous contribution to the Fund of the Research Station. If I may say so, it seems to me that your action is symbolic of the most cordial and close relations which exist to-day between mushroom growers and their sales distributors. For myself as a newcomer to the industry since the war, I have always found it a real pleasure to visit the wholesale markets where I now count many friends amongst their ranks. I hope you will pay us the compliment of visiting the Research Station, when we are in full swing, in the summer. Finally, it is kindness and generosity such as yours that give us confidence that we shall achieve our appeal, and by doing so, cement more firmly successful Mushroom Production in England."

Then came 100 guineas from **Messrs. Francis Nicholls Ltd.,** 50 Guineas from **Messrs. W. Darlington & Sons Ltd.,** £50 from **Messrs. Plant Protection Ltd.,** 40 guineas from the **John Thwaites** group, and £25 (p.a. for three years) from **Messrs. Geo. Monro Ltd.**

So many encouraging letters promising continued support were received that it proved impossible to reply to all personally. One must be selected as indicating the enthusiasm of many growers : " Requisition of my land by the Local Authority has practically ruined me, but I am so keen on your project, and so much appreciate your literature and advice, that I hope you will accept my very modest subscription towards what I consider a most excellent venture."

Two-thirds of the money required to maintain the Mushroom Research Station at Yaxley during 1949 was subscribed in one month after the launching of the Appeal. The total amount received as we go to press is £1,800.

This is a splendid result, surpassing the expectations of an optimistic Executive Committee. As was to be expected, now that the first " flush " has been picked, cheques are coming in more and more slowly ; but if every grower who has not yet contributed will " do his bit," the invaluable research so well begun will be able to continue.

There is a feeling—which was expressed at the Annual Meeting, and has been repeated in correspondence which can be summarised : " If the results are to be published whether or not I pay anything, why pay." The only answer can be : " If many growers think along these lines, the results will *not* be published ; there won't be any—research will cease."

The Executive Committee feel confident, however, that the very substantial *immediate* response will persuade growers who have not subscribed that this is an opportunity worthy of their support –of the support of everyone in any way concerned with the growing of mushrooms commercially.

THE NEW BOARD

Nominations for the new Board of Directors are now practically complete. It is composed of :—**Nominees of the M.G.A. :** Lt. General Sir Oliver Leese, *Chairman* ; Fred. C. Atkins, *Vice-Chairman and Managing Director* ; A. DeB. Hovell, J. Stewart-Wood, H. S. Allsop. **Nominees of original M.R.A. :** Major C. P. Whitaker, Capt. G. P. Lawrence. **Worthing and West Sussex N.F.U. :** H. G. Boxall. **N.F.U. Council :** J. R. Ashton. **Ministry of Agriculture :** Two (to be appointed).

Mr. Angus Watson has been appointed Secretary to the new Board ; the legal advisers are MESSRS. ELLIS & FAIRBAIRN, LONDON, and the accountants MESSRS. STEPHENSON, SMART & CO., PETERBOROUGH.

FROM THE PIONEERS

Among the subscribers who instigated Research on mushrooms at Yaxley, built and equipped the Station, and maintained the programme for the first three years, were the following :—

	£	s.	d.
Major C. P. Whitaker	2,650	0	0
Fred. C. Atkins (Noble Mushrooms Ltd.)	2,140	0	0
C. L. Sinfield (G. Sinfield & Son)	1,732	0	0
G. M. McArthur (Arbroath Mushrooms Ltd.)	1,300	0	0
F. L. Filmer (Lindfield Mushrooms Ltd.)	1,300	0	0
J. G. Hughes (Devon Mushrooms Ltd.)	1,244	0	0
R. H. Fryer (Nashleigh Mushroom Farm)	680	0	0
Capt. G. P. Lawrence	390	0	0
A. G. Pointing (Cartledge's Nurseries Ltd.)	360	0	0
Percy C. Major	300	0	0
H. Mount & Son	250	0	0
J. S. Gibbons	180	0	0
Curchin & Creasey (Datchworth) Ltd.	180	0	0
M. B. Blount	171	0	0
W. Sleight	160	0	0
Harding Bros.	120	0	0
C. G. Salter	97	10	0
A. P. Oliver	90	0	0
Lt. Gen. Sir Oliver Leese	75	0	0
J. J. Passmore	60	0	0
Pollard's Nurseries Ltd.	60	0	0
The late Major H. de Laessoe (Tasburgh House Ltd.)	52	0	0
A. DeB. Hovell (Church Farm Nurseries Ltd.)	31	10	0

LIST OF SUBSCRIBERS

The following subscriptions have been received as a result of the M.G.A. Appeal (up to the end of February) :—

	£	s.	d.
Broome & Green Ltd.	210	0	0
Francis Nicholls Ltd.	105	0	0
W. Darlington & Sons Ltd.	52	10	0
Plant Protection Ltd.	50	0	0
W. A. B. Harding	25	0	0
A. DeB. Hovell	25	0	0
Lt. Gen. Sir Oliver Leese	25	0	0
S. Middlebrook	25	0	0
Geo. Monro Ltd. (p.a. for 3 years)	25	0	0
Noble Mushrooms Ltd.	25	0	0
M. H. Pinkerton	25	0	0
Major C. P. Whitaker...	25	0	0
M. B. Young	25	0	0
J. Beveridge	20	0	0
British Basket & Besto Co.	20	0	0
T. Sturge Cotterell	20	0	0
Brig. A. S. G. Douglas	20	0	0
R. Duthy	20	0	0
H. Mount	20	0	0
A. R. Wills	20	0	0
R. Patterson	15	0	0
K. V. S. Francomb	12	12	0
J. Stewart-Wood	12	0	0
H. S. Allsop	10	10	0
W. V. Bateman	10	10	0
Murphy Chemical Co. Ltd.	10	10	0
John Thwaites (Cardiff)	10	10	0
John Thwaites (Liverpool)	10	10	0
John Thwaites (London)	10	10	0
John Thwaites (Manchester)	10	10	0
Adco Limited	10	0	0
R. I. Allan	10	0	0
Walter Appleyard	10	0	0
F. H. Austin	10	0	0
F. M. Bardsley	10	0	0
Geoffrey P. Barr	10	0	0
D. Beardsell	10	0	0
S. G. Biss	10	0	0
F. Bleazard	10	0	0
H. G. Boxall	10	0	0
Lt. Col. The Hon. B. T. Brassey	10	0	0
Broadham Produce Ltd.	10	0	0
D. A. G. Cattermole	10	0	0
H. T. Coates	10	0	0
J. Collingridge Limited	10	0	0
Gordon Collins Ltd.	10	0	0
I. H. Curchin	10	0	0
P. Danks	10	0	0
R. D. Dumbreck	10	0	0
G. E. M. Dyer	10	0	0
Thomas Elliott Limited	10	0	0
F. G. Evans	10	0	0
N. W. Fell	10	0	0
R. H. Filmer Ltd.	10	0	0
P. & T. Fitzpatrick Ltd.	10	0	0
Framptons Nurseries	10	0	0

	£	s.	d.
C. E. Funnell	10	0	0
R. A. N. Gamble	10	0	0
J. S. Gibbons	10	0	0
Greenyer Bros. Ltd.	10	0	0
S. W. Hannent....	10	0	0
Noel D. Harding	10	0	0
Major R. P. Henstock	10	0	0
C. F. Hopping	10	0	0
Geo. Jackson & Co. ...	10	0	0
Johnson Bros. (Derby) Ltd.	10	0	0
J. S. Kessler	10	0	0
H. Kilian	10	0	0
Kingfisher Mushroom Co.	10	0	0
Capt. G. P. Lawrence...	10	0	0
J. S. B. Lea	10	0	0
J. Lyons & Co.	10	0	0
Percy C. Major	10	0	0
Samuel McGredy & Son	10	0	0
R. Meade	10	0	0
William Morgan & Co.	10	0	0
T. Orritt....	10	0	0
C. Paget & Son Ltd.	10	0	0
A. J. Passmore....	10	0	0
R. H. Pinkerton	10	0	0
W. B. Randall Ltd.	10	0	0
H. M. Reed	10	0	0
Rex Products Ltd.	10	0	0
G. Rice	10	0	0
A. G. Sparkes	10	0	0
A. M. Stuart	10	0	0
Capt. Giles Tweedie	10	0	0
W. Wallace	10	0	0
R. W. White	10	0	0
Dr. R. G. Woodsend	10	0	0
E. G. Millais	7	10	0
G. V. Allen	7	7	0
W. H. D. Smith	7	7	0
Dr. James W. Sinden (U.S.A.)	6	0	0
R. N. Tinniswood	6	0	0
J. E. R. Simons	5	16	0
R. G. Warwick....	5	5	11
Eric Low Beer	5	5	0
Capt. M. M. Johnson	5	5	0
B. Morris	5	5	0
E. W. Newell	5	5	0
F. Allnutt	5	0	0
H. Anscombe	5	0	0
W. S. Belcher	5	0	0
Lt. Col. H. G. Bell	5	0	0
M. B. Blount	5	0	0
Brig. H. J. Bourke	5	0	0
Chas. C. Briggs	5	0	0
A. E. Cave .	5	0	0
G. J. Chaplin	5	0	0
F. R. Cooper	5	0	0
Capt. M. E. Few	5	0	0

	£	s.	d.
R. S. Forster	5	0	0
B. K. Gawel	5	0	0
S. Harden	5	0	0
Housing Estates Ltd., E.C.2.	5	0	0
W. L. How	5	0	0
G. A. Hymas	5	0	0
A. A. Jaffa	5	0	0
W. A. Jones	5	0	0
Malcolm Lacey	5	0	0
Land Settlement	5	0	0
J. C. Lucas & Sons Ltd.	5	0	0
J. F. Marchlewski	5	0	0
James Martland Ltd.	5	0	0
James H. Moorhouse	5	0	0
Lt. Col. E. Noel .	5	0	0
A. P. Oliver	5	0	0
C. Perkins	5	0	0
A. J. Perry	5	0	0
F. E. M. Praill....	5	0	0
C. G. Salter	5	0	0
S. A. F. Sampson	5	0	0
Z. Sancewicz	5	0	0
Major G. S. Scholfield	5	0	0
G. O. Stanland ...	5	0	0
G. E. Thirsk	5	0	0
J. R. Thompson . .	5	0	0
R. Turner	5	0	0
Col. W. A. Turner	5	0	0
W. A. G. Warwick & Son	5	0	0
A. G. Wood	5	0	0
Worthing & W. Sussex N.F.U.	5	0	0
D. Wyllie	5	0	0
W. B. Bentley	3	3	0
E. K. Alexander, Mrs.	3	0	0
Robert Gilchrist	3	0	0
R. H. T. Gibbens	2	2	0
Martin Bros.	2	0	0
Major C. J. Beckingsale	1	1	0
Major W. Chilton Riggs	1	1	0
Capt. E. C. Lance	1	1	0
G. Parkinson	1	1	0
Col. W. E. Shewell-Cooper	1	1	0
Dr. W. M. Ware	1	1	0
TOTAL	£1,796	8	11

A MEMBER HITS OUT

DEAR MR. WATSON, *2nd February*, 1949.

I note that a Synthetic Compost will be "Made Public" shortly. It seems rather illogical to call upon growers to pay a £5 sub. towards the upkeep of a research station if all the results of their financial support are going to be broadcast. Surely the sane thing for us to do is to keep our £5, and read all about the synthetic in some 4d. or 6d. periodical. What I would like to have for my £5 is an information bureau for the use of subscribers or members ONLY, and a service for the testing of pH, report on soils and any other advice that is required to keep a mushroom grower in good health.

Whilst I am on this subject I would like to see an association such as this going ahead to popularise the USE of mushrooms. How about a cheap leaflet printed in thousands which growers could slip into their chips when they send them to market? It could be varied from time to time: (*a*) recipes for cooking, (*b*) a dissertation on the Vitamin contents, (*c*) the protective foods, (*d*) the nourishing values, etc. Many of these would reach the public, such as restaurants, etc., who after all have a number of human beings connected with them, and would probably read them if interestingly written. There are so many aspects of the romance, as it were, of the mushroom industry.

Sometimes growers are left with too much prepared-compost to fill a house, or not enough. If we could contact you as a centre, and be put in touch with someone who is appropriate, it might be useful, as once or twice I have been rung up by a short grower. Also I would like an effort made to popularise the spent compost which, as a farmer, I know to be the finest manure extant for vegetables, etc. At present we have a job to dispose of it at times, at any price.

Now I am going to say something that hurts. I was one of the early enthusiastic members of the A.A. and must have paid about £100 so far in subs. I can have a service if I pay for it, or do it myself just as easily for a few 2½d. stamps. Such as going abroad. But the head man was knighted, and we have a smell of petrol., and rationing *ad lib.* And parking rules as good as Russia. I see the N.F.U. chief has just been knighted, but we still have direction as to the crops we grow (or else !) Permits for a few sheets of corrugated iron, and so on. And so on. Are you going to follow the band ?

This is the type of service I would like to get from time to time. I would like : a letter one morning saying Messrs. X, of Xtown, would be prepared to clear our mushroom sheds of spent compost, and remove it at 10/- per ton on 7 clear days notice.

I would like : a letter stating that arrangements had been made with a Messrs. X, of Covent Garden, that they will take all deliveries of mushrooms at a 5% commission basis, and will collect from terminal stations daily by van specially fitted to counteract damage in transit.

I would like : a letter stating that Messrs. X are prepared to keep a stock of chips for members for drawing upon during June, July and August, when there is a run owing to the soft fruit crops.

I would like : a printer who specialises in strong texture covers printed according to members requirements, with quick delivery.

Give considerable thought as to how you can make a grower make more money. Most people are not so interested in money, as they are in the things that it can buy. There are so many things that can be done on these lines, especially insurance for mushroom sheds, and indications that a certain supplier keeps large cedar wood stocks—and if one wants 6′ boards × 6″ × 1″ where one will get 6′ × 6″ × 1″ boards.

And above all fight the Government all along the line, and keep at it. We know that Income Tax collectors, and parking police are all jolly good fellows, but we don't like what they stand for and as such they must take the can back. After all WE pay for their parasitical lives.

I have tried to make my letter constructional as well as critical !

Yours truly,

Capt. D. K. Kirk.

THE SECRETARY REPLIES

3rd February, 1949.

Dear Captain Kirk,

I really do thank you for the letter. The Executive instructs me to do what they believe will suit the growers. The plain fact is that often we have to guess what the growers do want. Getting a straight-from-the-shoulder letter such as yours is a rarity.

With regard to the research question. The M.G.A. is not taking over the Research Station, but has sponsored the negotiations between the M.R.A., the M.O.A., and the Industry. If the Industry could have found the £4,500 per year, all information could have been kept for subscribers only. With the entry of the State into the affair the first condition laid down was that as government or public money was being spent, all information, past, present and future, must be made available to the public. When it is in full swing you will get all the services you want from the station, and so will everyone else! The original M.R.A. spent three years trying to get more members so that they could do just what you want, and incidently laid out £15,000 amongst about 20 members. Growers just would not come in, and could not see that the more numbers there were the lower would be the subscription rate — the result has been State partnership WITH conditions!

You are under no obligation to subscribe to the Research Fund but the simple fact is that if other growers take the same attitude there will be no Station, no information (this includes past information) and no advice service.

I would very much like to concentrate on doing my job — or what I take to be my job for the Association, including most of the things you would like to see happening to-day. If I was not really interested in the whole thing I am quite sure that the continual battle with government departments, the side-tracking, and the eternal delay and stupid questions would have driven me mad a long time ago. From the tone of your letter I see that you know exactly what I am talking about. It has to be done though. In the short time it has been in action the M.G.A. has done a great deal for the Industry — it is not enough by half and we intend to carry on with the good work — but it is depressing that so much time and energy should be wasted fighting a negative battle instead of a positive one.

The Association is not wealthy enough to employ the office staff to cope with the ordinary day-to-day mail and much of my time is spent in doing this work when I should be employed contacting the grower, the wholesaler and the sundriesman to find out methods of co-ordination such as you suggest, attending to the main policy of the Association and thinking and planning ahead. In point of fact I have no staff at all — just myself and a typewriter. We all realise the position, but until the M.G.A. is strong enough there seems little can be done about it. The amount of free time given by those growers who are on the Executive Committee, the Editorial Board and the Advice Panel is tremendous and given at the expense of their own farms. But we get too little criticism and realise it only too well; constructive criticism is essential to any virile organisation. Please keep it up.

Yours sincerely,

Angus Watson.

NEWS FROM AMERICA

Manure and Disease Problems

Crops in general have not been very high this year (1948). I think part of the reason is that there is a higher and higher proportion of strawy race-track manure being used by growers who have had no experience with it. Growers who have had only wet city manure do not realise the importance of early and complete watering. Some growers, of course, are having their usual big crops and production is not down much.

Prices have been good, better for the canned than the fresh product. When I say good this is relative as compared to yours. Growers who sell to canners and soup makers have received 29 to 33 cents per pound. On the fresh market the price has ranged from $1·25 to $1·75 for three pound baskets. One grower who sells only in pint packages is getting 22 cents per pint and feels that this gives him a good margin of profit. As his current production is 14,000 lbs. per day he does not have to have a very high margin per pound to realize a considerable sum.

One man reports that more than 1,000 riding horses are being slaughtered per week because there is not enough use for them to justify the expense of maintaining them. I am not sure of the source of his information, but he thinks the future ominous. One grower is making **synthetic compost** out of hay and corn cobs and expects to base his whole production on this material as soon as he can arrange to buy the ingredients in sufficient quantity. Interest in synthetics is still not very active, mostly because of the difficulty in obtaining the raw materials.

I am very glad that your **Research** Station has been taken over by the Association or is about to be. This is welcome news as I know it will be better for everyone concerned. I hope that, by now, all the necessary steps have been made for this annexation and that your Association can look forward to the New Year with special satisfaction over this accomplishment.

Disease problems have not been very great. Our most significant advance is in learning to control Spot and Dactylium mildew and Bubble by spraying the beds with the ethylene bis di-thiocarbamates. The zinc salt is best for the purpose. It is marketed in this country as Parzate and Dithane 2-78. We spray the beds after casing and again between the first and second and between the second and third breaks, using a concentration of half to three-fourths pound per hundred gallons of water. There is no effect on the mushrooms and the diseases are rather well controlled even when unsterilized soil is used for casing. In one of our mines this procedure has been adopted as regular practice and the owners are very enthusiastic. Under their conditions the mildew is not well controlled by the spray but in a regular mushroom house we have been able to eliminate this disease entirely even after it had appeared. In December I reported on our results before the American Phytopathological Society and I expect to publish on it as soon as I can find time. I suppose that like so many American products it will be very difficult for growers in England to obtain.

Please remember me to your associates and again express for me appreciation for all that was done to make my visit with you one of the outstanding experiences of my life. **JAMES W. SINDEN.**

M.R.A. REPORT ON S

Dr. R. L. EDWARDS Dis

ALL EXPERIMENTS CARRIED OUT AT YAXLEY DURING THE PAST THREE YEARS HAVE BEEN BASED ON THE TRADITIONAL MUSHROOM GROWERS' PRACTICE OF COMPOSTING WHEAT STRAW, WITH MIXTURES OF FERTILISERS REPLACING HORSE DROPPINGS.

It was already known that nitrogen must be supplied for this purpose, and straw has been composted with ammonium sulphate and ground chalk for general agricultural use since 1921. Previous work in France and U.S.A. indicated that phosphorus and potassium were also necessary in mushroom composts, and Stoller advised the use of a mixture of "trace elements" in very small quantities. American workers have used considerable proportions of other organic materials, such as wheat, brewers' grains, spent liquorice root, and oilseed residues, which are not readily available here since the war. Soil is also added to some of their synthetic composts.

A review of the literature showed that the experimental basis of many of the formulae and statements published was inadequate, and there were numerous contradictions (quite possibly due to differences in materials and local conditions). It was considered advisable to start from the beginning and study the proportions of nitrogen, phosphate and potassium required in straw composts to give the best yield of mushrooms, the best form of nitrogen to use, and the desirability of adding soil and trace elements.

Five series of experiments have been completed, and have given at least approximate answers to most of these questions. In every experiment at least three beds of 10 or 20 sq. ft. each have been filled with each compost and separately recorded. In the last four experiments two or more separate stacks of compost have been made with each mixture of fertilizers being tested. One of the weak points of much previously published work on synthetic composts is that there were not sufficient internal checks of this kind in the experiments described.

The following general points were clearly established:

1. **Source of nitrogen:**

   Dried blood is better than a mixture of nitro-chalk (3 pts.) and ammonium sulphate (2 pts.), giving equal amounts of nitrogen. Dried blood is better than an equal amount of nitro-chalk. A mixture of dried blood and nitro-chalk in the proportions 3 to 1 is better than 1 to 3.

THETIC COMPOSTS

es the New Formulae

2. **Quantity of nitrogen.**

   Although raising the added nitrogen results in increasing loss of nitrogen during composting it also increases the crop, up to 75 lbs. of nitrogen per ton of straw.

3. **Phosphorus.**

   Only superphosphate (18% P_2O_5) has been used, because it is a standard material readily available. The lowest proportion tested, 32 lbs. of superphosphate per ton of straw, was the best.

   The addition of some of the superphosphate at the end of composting was beneficial.

4. **Potassium.**

   With dried blood as source of nitrogen, the lowest proportion of potassium tested, 18 lbs. of potassium sulphate per ton of straw, was the best. The sulphate may be better than muriate but there is little if any difference.

5. **Trace elements.**

   Two mixtures have been tested ; one of them advanced cropping and increased the yield.

6. **Soil.**

   The addition of soil made the nitrogen problem more complex and has been abandoned for the present.

Further experiments are needed to determine more exactly the following points (and probably many others) :

1. The maximum useful proportion of nitrogen ; and a cheaper material than dried blood would be welcome.
2. The best proportions and time to add superphosphate and potassium.
3. The best proportion of gypsum.
4. Which of the trace elements are really essential, and how much of each is needed.
5. Which varieties of wheat straw are best and whether they need different treatment. What other kinds of straw can be used.
6. How many turns are needed, and at what intervals.
7. How much water is needed, and how the grower can judge and control it.
8. Whether other organic materials should be added.

This is a formidable but incomplete list and it shows how important further research on composts must be. Improvements on the synthetic compost now described may be expected during the next few years as these points are investigated.

DIRECTIONS FOR MAKING COMPOST

The first essential operation is to wet the straw *very thoroughly* : dry straw is surprisingly resistant to breakdown in composting. A very effective method of wetting baled straw, devised by Mr. B. A. Noble, is to lay the bales in a long row up to 3 deep, and to let water drip slowly on the straw from a drip-pipe. This is a pipe supplied with water through a T joint at its centre, and drilled along its top at intervals of 1-3 inches. The pipe must be levelled with wedges so that water drips evenly along its whole length. This device will wet a row of bales thoroughly in 48 hours. We find it very useful to ferment the straw in bales before making up the stack. This is done by arranging the wet bales in a compact block and covering them with a tarpaulin. In cold weather it is helpful to place dry bales round the sides of the block.

The wet straw ferments and heats up, softening its glossy protective coat so that if more water has to be added later it will be readily absorbed, and a tighter stack can be made. This preliminary fermentation may take 7 to 14 days according to the state and wetness of the straw and the weather. As soon as the straw is hot enough to steam it can be stacked in successive layers a few inches deep, each layer being covered with the activator (mixtures A and B).

The straw should feel wet when stacked ; if it is not it should be watered, preferably with a medium spray, before it is stacked with the activator.

The amount of activator per bale of straw can be calculated and this helps to spread the mixture evenly throughout the compost. The stack can be made up to 4-6 feet wide and 4-6 feet high, and should be well trodden down. It usually starts to heat up after a few days, and should reach 140° F., or more, within a week. It is then turned in the usual way, and this is repeated weekly. Mixture C is sprinkled on the compost at the last turn.

Occasionally a fresh stack has been slow to start fermenting, and it may be left for another week before the first turn. In such a case it is also helpful to surround the stack with bales of straw which prevent loss of heat. Composting is the same as with horse manure, and care in turning is just as important. The compost will be ready for filling 4 or 5 weeks from stacking, depending on the original state of the straw and the vigour of the early fermentation. Growers will have to judge whether it is ready in 4 weeks by appearance and loss of strength in the straw. Synthetic compost has no droppings and therefore seems rather longer than horse manure at the same stage of development. It can be filled rather wetter than is usual with horse manure. The surface of the beds dries out almost completely but this does not seem to interfere with cropping, and the beds should not be watered between filling and casing.

No large scale tests have been made on peak-heating in the house, but a small test with boxes suggested that heating to a bed temperature of 120° F. for 24-48 hours is highly beneficial. Spawning and management from that stage are normal.

THE LATEST FORMULA

ACTIVATOR A per ton of wheat straw (unwetted)

	cwts.	lbs.		lbs.
Dried blood (12%N)	3	0	Sulphate of potash	14
Superphosphate		14	Carbonate of lime	50
Gypsum		35		

If the dried blood has a different proportion of N, for each 1% more N, use 28 lbs. less blood : for each 1% less N, use 28 lbs. more blood.

ACTIVATOR B per ton of wheat straw (unwetted)

(Not to be used in galvanised containers)

	ozs.		ozs.
Manganese sulphate	12	Iron sulphate	12
Aluminium sulphate	$2\frac{1}{2}$	Copper sulphate	$2\frac{1}{2}$
Zinc sulphate	$1\frac{1}{4}$	Boric acid	$1\frac{1}{4}$
Ammonium molybdate	$1\frac{1}{4}$	Chromium sulphate	$\frac{1}{2}$
Potassium bromide	$\frac{1}{4}$	Potassium iodide	$\frac{1}{4}$

Activators A and B may soon be available commercially, ready mixed together, and C separately.

ACTIVATOR C per ton of wheat straw (unwetted)

Superphosphate 14 lbs. Gypsum 70 lbs.

The very small proportion of Activator B to be added needs special care to prevent loss and ensure even mixing. It can be made into a milky suspension by stirring in 1 gallon of hot water the mixture for 1 ton of straw. This suspension can be applied with a sprinkler or coarse spray (it may clog a fine one) each time a layer of Activator A is put on. Or the ingredients can be powdered, mixed, and applied as a dust.

QUANTITY TO BE USED : The amount of straw needed per 1,000 sq. ft. of bed varies according to its condition. With very fresh strong wheat straw 3 tons of straw may make enough compost for 1,000 sq. ft. If the straw has been used in windbreaks and has weathered for nearly a year, as sometimes happens, 4 tons will be needed. Both the Research Station and the growers have much to learn by experience on this and other practical aspects of composting.

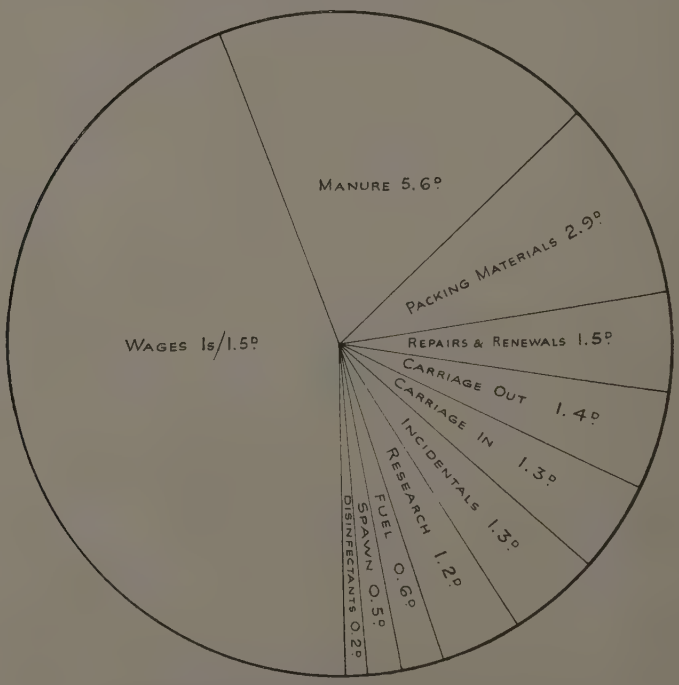
In conclusion, let no grower imagine that the use of this synthetic compost makes mushroom growing easier. It does not, and we neither claim nor expect that it will. With a horse manure compost the first very important part of the work has been done by the horse, and he probably does it more consistently than ever we shall. Man-made variations start with the amount of litter used, and continue throughout composting.

A synthetic compost is in the grower's hands from the very start, and is quite as easy to spoil as a horse manure compost. Its two great advantages are that it can be made at any time from stored materials, and it makes possible a uniformity which can rarely be attained in practice with horse manure.

NOTE. –Subscribers to the Research Station are strongly advised to see the compost being made at Yaxley, on 5th May, before starting to use it themselves.

Dr. J. W. Sinden, in a recent letter, emphasised the point I have just made. He wrote : " I know just what growers think about synthetic composts : that anyone can take such a formula and the first time produce prodigious crops with it. If you can only temper their enthusiasm until they have had a little experience you will accomplish much."

COPYRIGHT : *Copyright for the formula of the activators described in this article and the directions for preparing the compost are reserved by the Mushroom Research Station. Permission to reproduce may be given on application to the Secretary at Yaxley.*



IF MUSHROOMS COST 2/6 LB. TO PRODUCE

Diagram based on percentages supplied by Noble Mushrooms Ltd., Yaxley.

FRED. C. ATKINS thinking aloud . . . . . .

COUNTING THE COST

When mushrooms were fetching 10/- lb., accurate costing did not seem to matter very much ; few of us could tell off-hand what it cost us to produce a pound of mushrooms.

To-day the position has altered considerably, and several growers have told me that if the average nett price should drop below 4/- (which at one moment this year seemed likely) they would be compelled to stop growing.

Does it really cost us nearly 4/- ? I have done some calculations based on my farm's accounts for 1946 and 1947, and they reveal the following interesting information : wages 45% of total expenditure, manure 18·7%, packing materials 9·7%, repairs and renewals 4·9%, carriage outwards 4·8%, carriage inwards 4·4%, research 4·1%, fuel 1·9%, spawn 1·6%, disinfectants 0·5%, and incidentals 4·4% (comprising travelling 1·8, postages 1·0, bank charges 0·2, accountancy and audit fees 0·7, telephone 0·5, insurances 0·2).

Having so frequently heard it said recently that there would be no profit under 2/6d. nett, I related these percentages to that figure, with the following result : wages 1s. 1·5d., manure 5·6d., packing materials 2·9d., repairs and renewals 1·5d., carriage outwards 1·4d., carriage inwards 1·3d., research 1·2d., fuel 0·6d., spawn 0·5d., disinfectants 0·2d., incidentals 1·3d.

Recent visitors to Yaxley have expressed so much interest in these figures that I thought it worthwhile to publish this note about them, and to accompany it with a diagram. The massive segment absorbed by wages may surprise some growers, I know, but we hold the opinion here that on a mushroom farm every job must be done as well as it is possible to do it, or all other operations tend to suffer. To do this, to do the required job at the required moment, you must have adequate labour.

Research has cost us more than it has almost any other grower, for we have been closely interested in the Yaxley Research Station now being taken over by the Industry, and this enthusiasm has had to take the form of substantial annual contributions.

Packing materials, at almost 3d. a pound of mushrooms, include covers, tissue, and string, as well as chips, and will be a serious item if prices fall much lower.

Our fuel bill is not as heavy as it might be, because our houses were designed to minimise heat losses. They are brick-built in one block, only the south wall of No. 1 and the north wall of No. 24 being unprotected by adjoining houses.

It would be extremely useful to Mr. Watson if members interested in this matter of costing would supply him with comparable data on a percentage basis. The M.G.A. Executive sadly lacks statistics.

GEORGE H. COPLEY'S

MUSHROOM JOTTINGS

One of the last articles written by Mr. G. H. Copley, N.D.H., was the following note specially prepared for this Bulletin. Mr. Copley had many friends in the M.G.A., and his death in December was regretted throughout the horticultural industry.—Editor).

Here in Lancashire, where I reside, we are producing a pretty big weight of mushrooms. Some of the most successful concerns are located in buildings that once were cotton mills, but are not now suitable for that business. Some of the buildings are pretty old, and are situated in damp and steamy valleys. It is in such an environment that the best cotton is woven, and if I know anything, some of the best mushrooms are grown.

Over in Yorkshire the rhubarb growers in the Leeds area have taken to producing mushrooms in summer in their forcing sheds, which are not at that season required for any purpose in connection with rhubarb. Now anyone who has been inside one of those long, low sheds which are such a familiar sight in the rhubarb growing district, will know that the atmosphere, even on the hottest day, is markedly clammy. It is the atmosphere that evidently suits mushrooms, for big and clean crops are taken out of these sheds.

To come a little nearer home, I have a very successful mushroom shed. It is half buried, and all above ground is well thatched with Norfolk reeds. As the earth is continually impinging on at least half the shed, it follows that the atmosphere must become cellar-like. If one were to put a wine bottle in a corner, I imagine that it would very soon cover with mould. My average yield on the tiered beds works out at about 2½ lbs. per square foot. I consider that this is very good, for I have never yet become a three-pounder, though I may be some day.

Arising from this, I wish to suggest that if we can get any research done at the new Glasshouse Research Station (when we get it) it should concern the construction of the best type of shed. Let the research workers try the insulated shed above soil level, let them try a thatched, half-buried shed, give them the tip that an automatic sprinkler arrangement might go far towards solving the atmospheric humidity problem, let us know whether our pipes should be overhead, or more or less on a level with the beds. I know many of us have formed opinions on these matters, but we cannot back them up properly because we have no acquired data which we can quote against a control. If the Association has sufficient funds, it may with advantage promote an investigation into this very important matter.

The question of substitutes for horse manure is bound to be very high on the agenda until horse manure becomes more plentiful, a happy state of affairs that I cannot foresee, or until some economic substitute is evolved. The very greatest caution is needed here. There are on the market several synthetic preparations. I have tried them, but found them quite hopeless. I have, however, had encouraging results from growing mushrooms in an equal part mixture of sifted loam and dried powdered poultry droppings.

The heat of fermentation raises the temperature of the bed to about 65° F. which according to our well-tried teaching, is too low. Yet mushrooms grow in this mixture, and very good mushrooms too. The average yield is round 1½ lbs. per square foot. I cannot make mushrooms pay on that output, but I am emboldened to say that if some research worker were given time, he could improve the yielding possibilities of a mushroom bed made of sifted loam and dried, powdered poultry droppings. I have an idea that new and perhaps adaptable types of mushroom could be raised from spores. What is needed is a little more imagination. If attempts to raise new types were successful, there is no limit to the possibility of our industry. At the moment we are a little too circumscribed.

PRESS CUTTINGS

In the United States we import about 4,500 lb. of French spawn and 64,000 lb. of English spawn (annually).

WILLAIM FALCONER, writing in 1891.

Pressurisation equipment appears unnecessary in the transportation of fruit and vegetables by air, but humidity and temperature control do appear to be important. (Report on U.S. experiments on the carriage by air of fruit and vegetables). *Fruit Trades Journal*, 8.1.49.

There is no doubt at all that mushrooms are a profitable crop to grow, if the experiment is successful. One grower has taken over 600 lb. of mushrooms per week from a bed 600 sq. ft. in area.

J. W. MORTON, in *Poultry and Poultry Husbandry*, 9.3.34.

Neither too wet nor too dry is the vital rule for both manure and soil.

JIM MATHER, in *Daily Mirror*, 21.5.47.

Mushrooms grown under glass have not come along so well as last year, and two growers have told me that three pounds weight from the square foot will be the lowest they have ever done.

Lea Valley Correspondent, in *The Grower*, 1.1.49.

The words (in preceding extract) should have been "their pounds' weight." Lea Valley correction in *The Grower*, 15.1.49.

During 1948, their eleventh year in mushroom growing, Noble Mushrooms Ltd., of Yaxley, grew almost 7½ lb. per sq. ft., an increase of 23% over their previous year's record output. Last year 120,000 lb. from 20,000 sq. ft.; this year 147,500 lb.

Peterborough Advertiser, 7.1.49.

Mr. H. H. Glasscock, Advisory Mycologist at Wye, speaking at Southampton, said he felt there were many difficulties to be overcome before the mass-production tray method in use in America could be adopted in this country. *Nurseryman and Seedsman*, 16.12.48.

Continental and home growers should now get together so that the European producers may learn quickly that this country can no longer be the dumping ground for surpluses, said Mr. E. H. Gardener, Deputy President of the N.F.U., at Derby. *The Grower*, 25.12.48.

EXTRACTS FROM

A Mushroom Grower's Diary

Dec. 25. The answer to the perennial layman's question "do mushrooms really grow overnight?" is YES, on Bank Holidays and Sundays.

Dec. 30. How quickly should one be able to case a house with two men working on the beds and the necessary complement of "feeders." Is my 500 sq. ft. an hour a fair thing and is it wasteful to take about twice as long to fill the same area with compost?

Jan. 8. A film on running a high grade poultry farm shows a fumigation and clean-up process far more elaborate and precise than that of the mushroom grower.

Jan. 10. One or two replies to questions in the January Bulletin have been sent in to me, presumably by mistake. I feel they ought to be passed on for the benefit of the industry. *Question* 101. "The ideal humidity is 63·5729%. A small variation of *not more than* plus or minus 0·005% is allowable in fog, falling rain, hail or heavy thunderstorm." *Question* 105. "Your English seems to be somewhat confused. We do not quite understand how 'droppings-off' can be in the dung. *Droppings* are occasionally found in certain types of dung. 'Droppings-off,' however, are more often found in heavy transport dung and take the form of old horse-shoes, milk bottle tops, gear wheels, sparking plugs and fan belts. As these objects which have 'dropped off' are presumably not replaceable, they should be carefully taken out and kept in convenient piles when they will form handy missiles against marauding pigs. The yellow spherical spores are probably obsolete and redundant portions of dried egg. We agree it is very serious, and suggest spraying the whole plant with 100% petroleum spirit (red) and applying a match. If the compost is sufficiently thready, pick out the threads and use as dental floss. The matted portions can be used as boot-wipers." *Question* 107. "The fact that they are breaking their membranes quickly seems to indicate that they are over-reaching themselves. If they have long enough stems and are very light in weight they would make excellent tobacco pipes for the older men who have walrus moustaches and ill-fitting dentures."

Jan. 12. On the subject of Casing Soil, has anybody any views of the effect produced on the quantity or quality of mushrooms by applying soil in a wet or dry state? I have an idea that applied wet there is a tendency for a strong growth to build up in the lower half of the casing which will produce a definite type of mushroom, probably in large clumps, whereas a soil applied dry will allow a much more even concentration of mycelium growth, probably mushrooms of a higher quality, and not produced in heavy masses or clumps. There is, of course, with soil applied dry the problem of skilful wetting up. Applied wet, the point of contact moisture is there from the start, but applied dry the soil must be very carefully watered if the danger of damaging the compost surface is to be avoided.

Jan. 14. My fuel supplier insists that we are not important as coal users. He says he is simply quoting the Coal Board's views. Surely there is a lack of haison somewhere. We are now Food Producers recognised by *other* departments. The fact is here, at any rate that on engineer's report we are allocated a low grade fuel - anything that nobody else wants!

Feb. 7. Received the first post war "Mushroom News" from Darlingtons. Excellent practical reading. Yet, surprised to find that, in briefly reviewing 10 years, the Editor has not seen fit to regard the creation of M.G.A. as news. Are not the M.G.A. and M.R.A. (national research) the most important developments or "NEWS," and worth recording in this valuable publication?

Feb. 8. There have been little or no correspondence, interest or enthusiasm, in connection with the Grading Committee's reports and findings, so the Secretary tells me. And no wonder. I can admire the committee for the amount of work they must have put in, but not for the complicated, meticulous, time-wasting "controls"

they suggest. To grade according to their scheme one would have to employ several sets of precision callipers (with magnifier attachments) gauges, comparison charts, selection committees (working on shifts), not to mention arbitrators, checking depts., final inspections, and the boss's signature on every mushroom. It is my experience with all markets, that when grading one gets the best price for the best grades and poor prices for the lowest grades (naturally); but excepting London, for non-graded packs one gets the top price for all the lot (again—naturally, in the north, where we tend to live and let live).

Feb.14. The Insecticides Committee seems able to unearth new specifics with encouraging regularity, that is if you like trying lots of novelties. For my part I am faithful to the still malodorous Gammexane. Since starting to use it two years ago I think I have seen less than 100 flies. True I have had Cecid larvae (not flies, visibly) but repeated doses of Gammexane seem to clear even those gross damagers in time. So I don't enthuse too cheerfully on a large variety of specialised killers.

Feb. 16. From a Sunday paper: "Do you like bilberries, vodka, frozen eels, mushrooms. Mr. Strachey is buying lots of them from Poland. For the mushrooms you will have to wait until 1950 when the first of three annual instalments, each worth £10,000, will begin to arrive." I wonder how many lbs. that represents. Perhaps we shall never know the price of mushrooms in Poland!

Feb. 18. A friend of mine who is in business locally and is well equipped with steam, water and all the rest of it, has decided to switch over part of his plant to mushrooms. He started preparing the first compost which consisted of dry, racing stable manure, and I advised the application of a quantity of water. He produced a ½" hose of some 200 yards in length which was leaking at so many points that the emission at the spray end was almost undetectable. I had to observe that this was by no means sufficient for the job. He then produced a 2" fire hose with a jet of up to 50 yards and proceeded to play this on the stack. The resultant moistening of the stack was not consistent with good practice!

Feb. 21. I recently bought Racing manure at the rate of £5 per ton. A friend points out that properly pepped up it may not be more expensive (given equal results) than heavy dung, in that its bulk and square foot coverage are about four times greater than heavy manure.

Feb. 23. A relative, who has been put on a diet, was told by her doctor that Bovril, Oxo, and the like, have no food value, but that Mushrooms have. There can be no mistaking the last point, anyway.

Mar. 5. "Mac" Bulloch has spotted the following in the DAILY EXPRESS dated 2.3.49: "NOBODY tries to cook without salt and pepper," remarked Meal of the Month Club member Philip Harben, "but five other ingredients are as fundamental to good cooking. They are: *mushrooms*, cheese, lemon, parsley and tomato purée. With these alone or in combination you can produce the perfect garnish for anything. One good example: Mask thin fillets of fish with hot cheese sauce, decorate with sliced raw mushroom, brown under grill long enough to cook the fish, serve with sliced lemon." (*The italics are mine.*)

Mar. 7. From a correspondent: "I am interested in mushrooms and wonder if you can help me. I have had a town job for 30 years and now want to get into the country, preferably in or near your village. It would assist me if you would let me inspect your farm, give me advice about growing mushrooms, and advice about the possibilities of buying land. Could you use your influence to help me purchase such land?" Certainly Sir—I will *buy* the land for you. I will build you a *large* farm. I will tell you *all* I know. What is mine is yours; what is yours is your own, all for nothing. Social security.

Mar. 8. A recent meeting of the M.G.A. Executive was held in the Masonic Room at Frascati's. The notice board informed us that we were to be followed by a Masonic Lodge meeting. Our discussions were wearing on and a final outburst of acrimonious cross-talk (for which I was largely responsible) was leading up to a white heat, which the Chairman was about to calm, when the door opened and a serious voice asked doubtfully "Is this 'Tranquillity.'"

Dr. H. C. BELS-KONING
OF HOLLAND

describes her recent visit to

SWISS MUSHROOM GROWERS

After my visit to the English mushroom growers in July, 1948, in August I rather unexpectedly had the opportunity to study mushroom cultivation in Switzerland. I passed a fortnight over there and stayed with one of the pioneer growers. Though my sojourn was short, I was (to say) day and night in contact with all the work on the place. Moreover my host, Mr. Bänninger, was so kind as to take me in his car to 11 other mushroom farms in different parts of the country.

The Swiss claim to get big crops, and after the look of their beds they must be right. The comparison with the crops in other countries is somewhat difficult however, as they measure their production by m^3 fresh manure. With the heavy manure, they generally have 2 m^3 go to 1 ton. On this basis the medium crop in Switzerland as a whole, comes to 180 English pounds per ton. But with the efficient growers, crops of 290 English pounds per ton are the rule, while 440 pounds also occur. I cannot give exact data about the mines as I failed to visit enough of them. I was told that the crops there are but 130 pounds to the ton or perhaps merely 110. Though as a matter of fact crops of 110 pounds per ton are considered as a failure. The Swiss market does not take open mushrooms; I never saw an open one in a farm. Closed solid specimen are picked in sizes of 1-1½ inch diam. even when the temperature of the houses goes up to 17° C. (= 63° F.) At 19° C. (= 66° F.) cultivation becomes more difficult, but is not at all impossible.

The good results seem to depend on four factors:

1. Excellent ventilation.
2. The structure of the casing soil.
3. The Bänninger method of heating and watering the beds.
4. Maybe also the heavy manure.

Ventilation. Most of the Swiss places are artificially ventilated. Many have some sort of air conditioning; sometimes the air is sucked through a long canal, passing under the earth to cool it in summer, sometimes it is cooled by chloraethyl or with cold water from a mountain

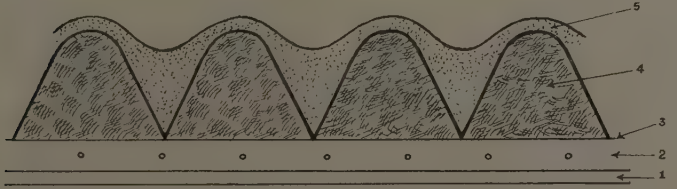
lake. Before the air enters the house it often is wetted by a spraying machine or by passing it through a curtain of water.

When there is no artificial ventilation, many shafts or chimneys are to be found everywhere, each relatively small area of growing room having one.

Casing soil. In imitation of Mr. Bänninger, ground tuff is used by practically every grower. This is a crumbly, granular soil with good water-holding capacity, allowing excellent aeration. The alkalinity is a bit high as a consequence of its chalk content (about 80%). This is a drawback and may be the cause of failure with growers who have to water heavily.

The Bänninger method of heating and watering the beds consists in the following principles : a stoney layer of very high water capacity is heated. The top of this layer is smooth so that it may be cleaned and scrubbed, but still porous. It carries the ridge beds. The watersoaked heated layer is insulated underneath to prevent loss of temperature at the bottom. The beds are cased with the tuff and the trenches in between are nearly completely filled up with this material. After casing the trenches are drenched with water, so that they are filled up completely ; after a few minutes however the water disappears in the stoney layer and does not affect the manure. Occasionally the beds are watered at the top slightly with a hose. When they become too dry, the trenches are drenched again. In summer when the heating system is not working, drenching is only rarely necessary.

Switzerland is an "electrical country," electrical energy being cheaper than coal heating. Coal mines hardly occur, or give no good quality. So many growers use electricity for heating. Here Mr. Bänninger had another very good idea. He transformed the current from the electricity company to a low voltage and high amperage. From the transformer to the beds the energy is transported by wide copper strips to avoid loss in the form of heat. These strips are not insulated and may be touched without any danger. Inside the heating layer of the beds the current passes through narrow copper wires, which heat up easily. The handlamps also burn on a comparatively low tension, so that everything in the thoroughly wet rooms may be safely handled.



1. Bed base. 2. Stoney, water-holding layer, carrying copper wires.
3. Smooth surface. 4. Compost. 5. Casing.

The manure. Switzerland not being a cereal-growing country, straw is rather scarce. Part of the manure comes from the army stables. Travelling by car, I got the impression that there was a fair number of horses. As a consequence of the shortage of straw, the manure is very heavy and sometimes contains really very little straw. This is mixed in, but only to a small amount, after being soaked in water or water with fertilizer. Very high amounts of gypsum are used, up to 100 or 150 English pounds per ton. In consequence of the heavy manure the heaps are low and turnings take place each four to five days, so that the whole process is completed in 16-20 days. Some Swiss think that the same results may be obtained with strawy manure provided the straw is saturated with urine. According to others this is impossible. I did not see enough compost heaps on my visit in England as to be sure in this case, but probably what the Swiss call " strawy manure " might be called " normal " or " rather heavy " in England. In comparision with Switzerland our Dutch manure is extremely strawy.

With the above-mentioned installation the costs of production in Switzerland are about 1s. 8d. a pound.

Mr. K. BANNINGER (*above*) and one of his growing sheds (*right*)

With the growers who have a less good installation, and partly in the mines, many of the classic French methods are still in use, but much refined. When there is no artificial heating the Swiss know how important it is to conserve in the beds the natural heat of the manure as long as possible. This knowledge got completely lost with the Dutch and Belgian mine growers. Ample ventilation is generally provided.

However high the standard of the technical side may be, as for the knowledge about diseases and the sources of the various pests it seems to me that the Swiss growers are no match for the English. The best growers excluded, many of them disinfect at random without fear to damage the mushrooms or to injure the health of the consument. More often it is not exactly known whether a disinfectant is effective against insects or fungal disease.

In England, we found most of the growers we visited well up in the matter of disease prevention and control. The excellent work done at Wye College has found it way to the growers, who are as well in touch with the research work in the U.S.A. The M.G.A. Bulletin forms a first-rate medium to keep them in contact with the newest discoveries. In Switzerland there is no scientific research and no advisory work. The English and American work is hardly known.

As the English are very strong on the scientific side of mushroom growing and the Swiss have mastered the technical side to such an extent, exchange of thoughts between the two of them would be very fruitful.

CORRESPONDENCE

In Mushroom Growing Insects, Pests and Diseases, by R. Mas, I was very interested in the section devoted to alternative manures, especially fowl manure ; in a letter I received recently from a friend growing mushrooms near Sydney, he tells me the heaviest and best crops he's seen this year have been those grown on a compost made up with fowl manure. This commodity it appears is sold in Australia at something around £6 5s. 0d. per ton against a price here of between £17 £20 per ton ; if the demand existed among British mushroom growers for this alternative, do you think it would be outside the range of possibility to import this commodity on a co-operative basis ? Also, if I may, I would like to make another suggestion regarding previous numbers of the M.G.A. Bulletin. Since the inauguration of the Association, many members who have joined in the last year or two would be only too pleased to obtain back numbers of the Bulletin issued prior to their becoming members. If I may suggest it, do you think it would be a proposition to say insert a " questionnaire " in the next Bulletin asking if the individual member was interested in the purchase of the preceding volumes. If the response was encouraging enough, these could be reprinted and bound, or perhaps sold singly if you thought it the better course, but for a bound volume I would be only too pleased to offer £1 5s. 0d. per volume. The profit arising from such sales could be directed to furthering research work at Yaxley. Anyway, please accept it as entirely a suggestion on my part, but I rather think a referendum among grower members concerning this would prove rather interesting.

NORMAN FELL.

Do you by any chance know of any Rotarian mushroom growers in the Association? I am one and would like to meet or correspond with them. CAPT. D. K. KIRK.

May I add my appreciation of your services and the Bulletins? I find them extremely informative and a pleasure to read. I started with the 'tier' or 'bunk' system, but after reading Bulletin No. 9, with Dr. Sinden's article on the 'Tray System,' I said to myself, "Well! That answers lots of the problems in mushroom growing to-day, and is certainly how mushrooms will be grown in the future." So I sold out all my tiers, etc., and have now approximately 1,000 trays 2′ 6″ by 2′ 5″ and have already had nine crops of 1,000 square feet each in three houses since March this year, and I assure you that growing in trays is much better in dozens of ways. Of course I am quite new to it yet and must not commit myself, but I promise in the New Year I will endeavour to get an article together on the practical advantages I have found with the Tray System. T. ORRITT.

I have noticed that in all text books on mushroom growing, emphasis is always laid on the fact that when spraying beds, care must be taken not to allow nicotine to run through the casing soil into the compost, as, to quote, 'this tends to damage mycelium and so shorten the life of the beds.' Does it? I wonder! I have deliberately on two separate occasions taken, out of a producing bed, a complete section and dumped it in a greenhouse tomato bed and just left it to be watered along with the tomato plants, usually every evening. The amount of water that piece of bed got was out of all proportion to what I carefully and delicately gave it with a fine mist spray when it was in its proper setting, and yet it grew mushrooms perfectly, and if anything far better. The same thing usually happens when a bed is considered 'grown out' and the compost and casing soil are just 'chucked out' into the garden at the mercy of the elements. In 9 cases out of 10 a good crop results *and* persists. With the exception that I agree cleanliness is essential, I begin to believe that we are in danger of 'coddling' our mushroom beds and allowing them to become like a spoilt child, due to too much indulgence in whims and fancies. J. S. FLEETWOOD.

GUERNSEY GROWERS. When the Germans threw up the sponge on Guernsey they left behind them many miles of underground passages and storehouses which had been carved out of the clay and granite of the island's interior. The most extensive of these tunnels or burrows was a system created for use as an underground hospital at St. Andrews, in the very centre of Guernsey and occupying some 70,000 square feet . . . It has been put to good purpose by two young local men, Messrs. N. Dodd and B. Parker, who have inaugurated within its gloomy depths a commercial mushroom farm . . . . . Production now has reached an average of several hundred pounds per week, and it is hoped that this will be increased considerably.

BASIL C. DE GUERIN, in *The Fruit Grower*, 25.3.48.

A Break with French Tradition

MONSIEUR DESNOUES BUILDS SPECIAL HOUSES

In common with many other Frenchmen, the Desnoues family have for a number of years grown mushrooms commercially in caves. It has been left to Monsieur Yves Desnoues, Hon. Overseas Member of the M.G.A., to make the break with national tradition and build the first specially-designed mushroom houses above ground to be seen in France—the birthplace of mushroom "cultivation."

While on a visit to this country in January, 1947, M. Desnoues called in on the Yaxley headquarters of the M.G.A. and was shown around the modern farm operated by Noble Mushrooms Ltd., whose Technical Director was at that time our Hon. Secretary. On his return home he designed his new houses at La Tour de Salvagny (Rhone) after the style of those he had seen at Yaxley. He built in asbestos lined with glasswool.

M. Desnoues writes to the Editor: "Insulation is good; I am able to maintain 15°C. easily, and a peak heat in one house does not alter the temperature of the house adjoining. My heating system is electrical. Two 2Kw. tubes running along each side of the house are sufficient to maintain a growing temperature; for peak-heating we add radiators. Each house contains two sets of beds in four tiers, giving an area of 1640 sq. ft.

"When I started, my first worry was the use of Carbonyle, derived from anthracine oil, for preserving bedboards. The smell persisted and eventually stopped spawn-growth. My second trouble was the casing soil. I used a soil which looked sandy but set like cement when wet. I recased with ordinary soil and got 1½ lb. per sq. ft. The soils around here are terribly acid. I am now wondering whether to try ground gypsum for casing.

"The mushroom market in France has been going down these last three months, partly because of the abundance of wild mushrooms this year and partly through increased production by commercial growers. On the other hand the price of manure has fallen a little."

It began as a hobby! The tenant of a house in Higher Shotton, nr. Chester, has been described in Court as "very undesirable" because he was growing mushrooms in soil and manure on the parlour floor.

ADDITIONS TO THE LIBRARY.

Darlington's Mushroom News, Vol. II, No. 1 (1949), presented by Messrs. Darlington & Sons Ltd.; C. J. La Touche *Spore Prints from Individual Phialides of Verticillium spp.* (1949), presented by the author; and T. Rautavaara *Studies on the Mushroom Crop in Finland and its Utilization* (1947), also presented by the author.

Mr. MILTON GRISCOM: The M.G.A. heard with regret recently that the American Industry had lost in a motoring accident one of its most important growers and canners, Mr. Milton Griscom, head of the Brandywine Mushroom Company.

Mushroom Madness

(We are not quite sure what emotion prompted the author to write on the vicissitudes of mushroom growing, but we think she must have suffered pretty badly from mushroom madness herself, for her article bears the mark of true authority. If some members have already decided not to be bitten by the mushroom bug, this article will make them preen and congratulate themselves that they, at any rate, are not susceptible to the disease. The Editors of *N.F.U. Growers' Gazette* for Area 3, November, 1947, with whose permission this lighthearted contribution is reprinted).

CULTIVATED Mushrooms hardly ever pay; producing them is hard, unpleasant work; marketing them is a nightmare because they are so perishable; it is almost impossible to get enough manure for them; only the insane would attempt to grow them.

If you don't agree, why not? What figures can you produce to prove they do pay? What do you like about the work attached to growing them? Were you able to market them between the wars? (The fact that you can sell them now proves nothing. You can sell a gas stove to an African Negro to-day, and he'll come and collect it and pay cash). Is it easy for you to get manure? Are you insane? All this is wrenched from me because I find that people who are looking around for a paying branch of Agriculture are catching that deadly disease, Mushroom Madness, again. Some people got it fatally after the 1914-1918 war; it seems to breed in the post-war atmosphere. I met a man only the other day, just out of one of the Services, who said he was going to start Mushroom Production. I asked him why on earth, and the poor chap said: "Because I want something that pays, and I hate an office life."

Now round about 1934, I knew several men like him one bought an old mill, one converted a large shed, one had an Oast house and they all said the same thing. After a year or so, they gave it up because they said they would rather go bankrupt some pleasanter way. They were sick and tired of working in dark, cramped, dirty, moist conditions; sick of all the diseases and pests mushrooms are heir to; sick of trying to get manure that had *not* been spoiled by disinfectant, did not cost the earth and was not three parts town refuse and more than all else sick of turning the damned stuff once they had got it!

They found, as any grower could have told them, that mushroom cultivation is not just a matter of placing the spawn in the bed and then going away till it is time to gather the crop. It is a day after day job in dim artificial light. I will describe it briefly to prove I do know something about it, and am not just writing through my hat.

The best building for mushrooms is an underground one, because of evenness of temperature and better (!) humidity, and they grow best in total darkness. They must have good ventilation, but no cold draughts. Of course, drainage in such a place is difficult and you will be flooded out more than once if it rains hard, I gloomily expect.

But before you make up the beds the manure must be prepared, and a covered shed is best for this. First you must shake out the long straw and mix the droppings as evenly as possible and keep it well trodden and watered (but not too wet) to generate heat. When this happens and steam rises thickly, you open the heap to cool it down, turn, and re-build it. When you have done this three or four times it is ready and you cart it down to your dark, damp but airy subterranean chamber—and I am willing to bet a substantial sum you have to barrow it, because there isn't room for cart or tractor.

Then you build up the beds—usually $2\frac{1}{2}$ feet at the base, and 7 or 8 inches deep. The temperature of the bed rises rapidly now, and as soon as it has cooled again to 70 degrees you can plant the spawn. The main thing about this is that it should be firmly pressed into the manure and when it begins to run freely, when the white threads show in the bed, the whole beds must be cased with an inch or so of soil. There must be no weed seeds or insect pests in this soil, so you will have had to sterilise it in some way, and it wants to be light and fine and porous, so you will need to sift it all, and then you barrow it all in and case the beds. This must be done firmly and evenly, and watered as little as possible, and all the water you use must be warmed.

In three or four weeks the mushrooms *should* come up and you can start picking. You can also start spraying against mushroom fly, setting potato traps for woodlice, and ordinary traps for mice. I won't depress you with the other things in that line that you can start doing about now. You will find them all out soon enough. You can also look around now for a market for the mushroom bed compost, which you will have to barrow up when the beds are exhausted (before you barrow down the new stuff) and dispose of it somewhere. Even I will admit that this is not difficult, because every gardener wants it so much that they will even collect it.

You can then get out your books and count up your profits, and see if mushrooms really do pay *you*.

Oh yes, mushrooms *can* pay. I admit that too. Run as a small side line on a big nursery or farm they show a reasonable profit, taking one year with the next. People who have the selling organisation, who can get the manure, and who have the necessary labour and experience, do make money from them. But oh, what a way to spend your life, what a way of making a modest profit at the best of times! P.ff.

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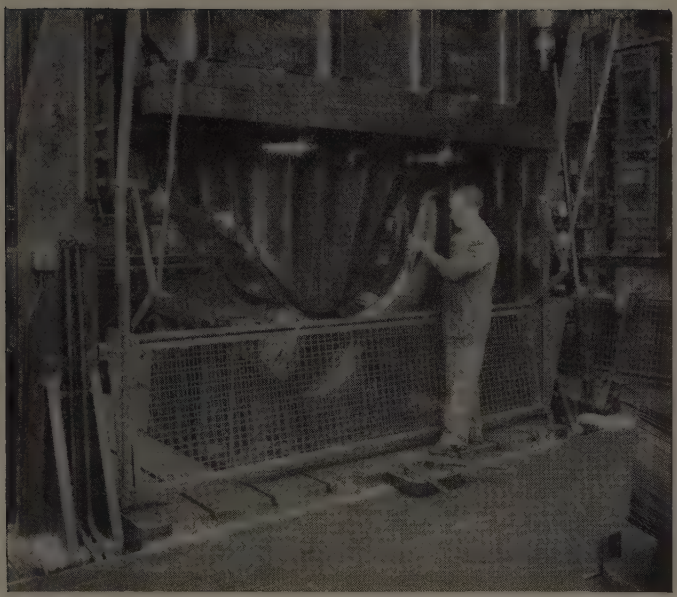

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YOUR REF.

24th February, 1949.

Dear Sir,

Celcure Treatment of Mushroom Bed Boards.

Three Celcure treated bed boards were used for one crop in No. 12 House by Messrs. Noble Mushrooms Limited, during 1948-9. The yield was not separately recorded, but no difference in crop on the part of the bed over these boards was observed.

The mushroom mycelium grew right down to the surface of the boards. There was no evidence that toxic material had diffused any appreciable distance into the compost.

At the end of the crop the top surface of the boards, which had been in contact with the compost, and the under surface were swabbed with distilled water, and the washings were tested for chromium. Enough chromium was extracted to give a definite reaction, but it is not possible to give any useful estimate of the amount. There appeared to be rather more in washings from the under side of the board, which may mean that some chromium had diffused into the compost.

Conclusion: At the end of a mushroom crop chromium was present in the washings from Celcure treated bed boards, but there was no evidence of any injurious effect.

Yours faithfully,

R L Edwards

Director of Research.

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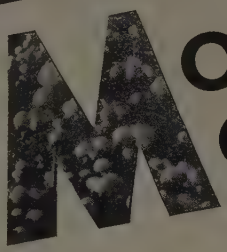

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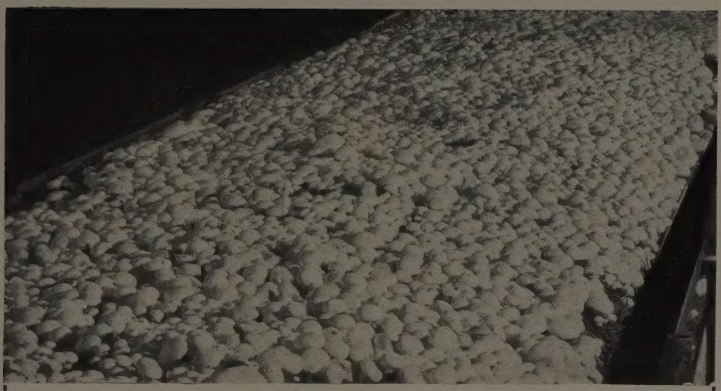

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